



Game Changing Resin/Coating/Adhesive Technology for Lightweight Affordable Composites

PI: Scott Lewit

Project ID: MAT256



Project Overview

Timeline

Project Start Date: June 28, 2021
Project End Date: Dec 30, 2022
Percent Complete: 75%

Partners

Dr. Mirmilad Mirsayar (FIT),
Interplastics, Mainstream,
Wabash, Applied Science, Carbon
Rivers, MITO, TLC, Trinity, THOR

Budget

Total Funding: \$199,256

Barriers & Technical Targets

- Supply chain issues associated with Covid-19, natural disasters, and staffing shortages have slowed progress activity.
- Supply chain issues resulting in SCI requesting a no cost extension for phase 1 & 2 application.
- Develop an advanced ultra light composite materials for high-volume, high-performance, economic vehicle applications, adaptable to modular soft rapid tooling with low capital cost of entry and compressed lead times.

Relevance

CoCure Resins, Coasting's, & Adhesives for Hybrid Composites

- CoCure hybrid thermo-set resin/metal-hybrid composites laminates offer high impact on various industries as a material that is pre- and post formable with the unique ability to be married with alloys and thermoplastics, while still retaining mechanical properties of metallic structures.
- Improved structural performance leading the lightweight structures. The lightweight means less fuel consumption resulting in a smaller environmental impact.



Summary

- Achievement of high volume, high performance, and low cost ultra lightweight composite and hybrid materials to facilitate improved fuel economy and reduce environmental impact through composite resin, coating, and adhesive technology advancements.
- Structural Composites developed CoCure technology consisting of combining a gelcoat and a two-part urethane at various ratios. The urethane gives the gelcoat needed strength in high stress areas of the part. Using CoCure SCI is developing advanced versions for automotive usage.

Milestones & Approach

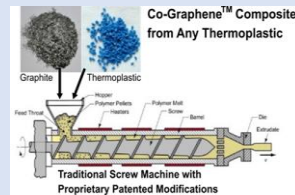
SCI discovered formable CoCure resin/metal-hybrid composite laminates suitable to be stamped or shaped, before or after curing, into intricate 3D components and large section-active structurally integrated body panels.

Objective

- SCI advanced resin/laminate enhancement using nano/micro/macro fortifies. Improvement in resin performance was developed through inter-mixed conventional nano powders.
- Enhancements in materials and adhesives through experimentation in interfacial load transfer for arresting crack propagation and delamination prevention in composites is being utilized.

Technical Progress

- Identification, fabrication, and testing of material matrices have been established. Fiber-bridging additives of graphene & carbon nano-tubes, environmentally friendly bio-fibers and starches dispersed in polyols, polyesters, and urethane resin blends for enhanced mechanical properties are among these.
- An innovative approach combining graphene into thermoplastics are being tested. Working plans have taken the thermoplastic precursor of unsaturated polyesters and compounded it with a high level of (up to Graphene, 35%).



Future Research

Potential phase 3 discussions with large OEM partners on the results of these efforts were completed over the course of this project. Wabash is deployed using our Navy SBIR technology; however, the focus now is reducing cost and weight. Both show strongest interest in the development of enhanced resin properties, a low-cost high-performance adhesive, and metal alloy hybrids. Any proposed future work is subject to change based on funding levels.